

CLAIMS

1. A method for transmitting non-real time traffic in a connection oriented communications network, the network comprising a network core which includes a source and a destination, the source and the destination having a path therebetween, the non-real time traffic being received at the source from a plurality of connections and each of the connections being associated with one of a plurality of classes of transmission service, the method comprising the steps of:

(a) at the source, aggregating the non-real time traffic received from said connections onto the path, the non-real time traffic being transmitted on the path without regard to the connections with which the non-real time traffic is associated;

(b) at the destination, segregating the non-real time traffic so transmitted on the path within the core according to the corresponding connections with which the non-real time traffic is associated; and

wherein flow control is applied between the source and the destination to thereby regulate the rate of transmission of the non-real time traffic along the path.

2. The method of Claim 1, wherein the connection oriented communications network is an ATM network, the connections are Virtual Channel Connections (VCCs) and the path is a non-real time Virtual Path Connection (VPC).

3. The method of Claim 2, wherein the flow control applied between the source and the destination includes a flow control algorithm whereby the rate of transmission of the non-real time traffic on the path is regulated by providing feedback information to the source concerning congestion at a contention point on the path.

SUB 87 4. The method of Claim 2, wherein the flow control applied between the source and the destination includes a flow control algorithm whereby the rate of transmission of the non-real time traffic on the path is regulated by providing an explicit rate of transmission to the source.

5. The method of Claim 4, wherein the non-real time Virtual Path Connection operates according to an Available Bit Rate (ABR) service category.

SUB 88 6. The method of Claim 1, wherein each of the connections is provisioned with a guaranteed bandwidth, and the non-real time traffic on the path is provisioned with a guaranteed bandwidth which is obtained by summing the corresponding guaranteed bandwidths for each of the connections aggregated onto the path.

SUB 89 7. The method of Claim 6, wherein the guaranteed bandwidths corresponding to the connections and the path are guaranteed minimum bandwidths.

SUB 90 8. The method of Claim 7, wherein transmission bandwidth in the core network is allocated between real time traffic and non-real time traffic, and wherein a share of the transmission bandwidth in addition to the guaranteed bandwidth for the path is made available to the path if the transmission bandwidth allocated to the real time traffic is unused.

SUB 11 9. The method of Claim 7, wherein transmission bandwidth in addition to the guaranteed minimum bandwidth is made available to a corresponding connection if the guaranteed minimum bandwidth that is allocated to another connection is unused.

SUB 12 10. The method of Claim 5, wherein the source to destination flow control applied between the source and the destination is provided by a plurality of ABR flow control segments between the source and the destination.

SUB 13 11. The method of Claim 10, wherein the source further comprises a set of queues each corresponding to one of the plurality of classes of transmission service that are associated with the

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plurality of connections, and wherein the non-real time traffic received over each connection is queued in the queue associated with the class of transmission service associated with each connection before aggregating the non-real time traffic onto the path.

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12. The method of Claim 10, wherein the source further comprises a queue for each connection and wherein the non-real time traffic received over each connection is queued in the queue associated with the connection before aggregating the non-real time traffic onto the path.

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13. The method of Claim 11, wherein traffic management is applied to the non-real time traffic at said source.

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14. The method of Claim 13, wherein the traffic management comprises scheduling of the connections onto the path.

SUBB177
15. A network entity for use in a connection oriented communications network, the communications network comprising a network core wherein traffic entering the network core is aggregated from a plurality of connections onto paths within the network core and wherein traffic exiting the network core is segregated from said paths onto connections outside the network core, the traffic comprising real time traffic and non-real time traffic, the real time traffic and the non-real time traffic each being aggregated onto respective real time paths and non-real time paths, the real time traffic on each real time path being transmitted from a corresponding source to a corresponding destination according to a first class of transmission service and the non-real time traffic on each non-real time path being transmitted from a corresponding source to a corresponding destination according to a second class of transmission service, and wherein flow control is applied between the source and the destination corresponding to each non-real time path to thereby regulate the rate of transmission of the non-real time traffic along said non-real time path, the network entity comprising:

20 (a) a first queue for storing real time traffic received at the network entity over at least one of said real time paths;

(b) a second queue for storing non-real time traffic received at the network entity over at least one of said non-real time paths;

(c) a scheduling mechanism for servicing the first and second queues to thereby respectively generate non-real time traffic and real time traffic in an outgoing direction; and

(d) a flow control mechanism for regulating the rate of transmission of said non-real time traffic received at the network entity along each of said non-real time paths.

16. The network entity according to Claim 15, wherein the first and second classes of transmission service are respectively real time and non-real time classes of transmission service.

17. The network entity of Claim 16, wherein the flow control mechanism thereof provides an explicit rate of transmission to each of the corresponding sources of the non-real time traffic received at the network element.

18. The network entity of Claim 17, wherein the explicit rate of transmission is determined based upon a state of congestion of the second queue.

19. The network entity of Claim 18, wherein the state of congestion of the second queue includes a determination selected from the group comprising queue depth and queue growth rate, wherein the queue depth and queue growth rate are associated with said second queue.

20. The network entity of Claim 17, wherein the first queue is served in preference to the second queue, such that at every service opportunity the second queue is served only if the first queue is determined to be empty, and if the first queue is determined to be not empty then the first queue is served until empty.

21. The network entity of claim 17, wherein the connection oriented communications network is an ATM network, each of the real time paths is a real time Virtual Path Connection (VPC) and

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each of the non-real time connections from which traffic on the real time paths is aggregated is a non-real time VPC.

22. The network entity of claim 21, wherein the real time class of transmission service is the Constant Bit Rate (CBR) service category and the non-real time class of transmission service is the Available Bit Rate (ABR) service category.

SUB 207
23. The network entity of claim 22, wherein the flow control mechanism provides the explicit rate of transmission to the non-real time VP source by way of information carried in Resource Management (RM) cells.

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SUB 217
24. The network entity of claim 23, wherein the network entity receives the real time traffic over a plurality of real time paths, wherein each real time path is associated with a Peak Cell Rate (PCR) and wherein the flow control mechanism determines the explicit rate of transmission for each of the non-real time paths by deriving an available bandwidth for the non-real time paths based on the PCRs of the real time connections and allocating a share of the available bandwidth to each of the non-real time paths.

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SUB 227
25. A connection oriented communications network, the communications network comprising a network core wherein traffic entering the core is aggregated from a plurality of connections onto paths within the network core and wherein traffic exiting the network core is segregated from said paths onto connections outside the network core, the traffic comprising real time traffic and non-real time traffic, the non-real time traffic which enters the network core being received from connections that are each associated with one of a plurality of classes of transmission service such that at least two connections are associated with different classes of transmission service, the real time traffic and the non-real time traffic each being aggregated onto respective real time paths and non-real time paths, the real time traffic on each real time path being transmitted from a corresponding source to a corresponding destination according to a first class of path transmission service and the non-real time traffic on each non-real time path being transmitted from a corresponding source to a corresponding destination according to a second class of path

transmission service, and wherein flow control is applied between the source and the destination corresponding to each non-real time path to thereby regulate the rate of transmission of the non-real time traffic along each said non-real time path.

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1970	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100